Montana
North Dakota

REGIONAL
QUALITY
REPORT
2005

U.S. Northern Grown Durum Wheat

for premium pasta

Durum is the hardest of all wheats. Its density, combined with its high protein content and gluten strength, make durum the wheat of choice for producing premium pasta products. Pasta made from durum is firm with consistent cooking quality. Durum kernels are amber-colored and larger than those of other wheat classes. Also unique to durum is its yellow endosperm, which gives pasta its golden hue.

When durum is milled, the endosperm is ground into a granular product called semolina. A mixture of water and semolina forms a stiff dough. Pasta dough is then forced through dies, or metal discs with holes, to create hundreds of different shapes.

Durum production is geographically concentrated to the Northern Plains because it demands a special agronomic environment. The states of North Dakota and Montana in most years jointly produce 80 percent of the U.S. durum crop. Farmers in California and Arizona grow the remainder.

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2005 OVERVIEW

The 2005 North Dakota and Montana durum crop is 15 percent larger than last year and the five-year average, enhanced by a 14 percent increase in harvested area and yields similar to 2004's but considerably above average. Largely favorable production conditions allowed growers to harvest a high quality crop with a strong grade profile. The crop boasts improvements in several key parameters including semolina extraction and color.

The regional average grade is No. 1 Hard Amber Durum with more than 70 percent of the crop grading No. 2 HAD or better. The regional average vitreous kernel count of 91 percent and the average falling number of 378 seconds are indicative of the dry, nearly ideal harvest. Average test weight of 60.8 pounds is above the trend line, but below last year's exceptional level. Late season heat impacted kernel fill in some areas.

While beneficial growing conditions boosted crop yield in northern areas, they also held average protein content to 13.4 percent, equal to last year but below normal. Still 78 percent of the crop has 13 percent protein or greater, up from 70 percent in 2004.

The crop's processing traits are improved over last year and the five-year average. Total extraction and semolina extraction are higher on the Buhler laboratory mill. Ash content is somewhat higher, but semolina speck counts are lower. Mixing strength of the semolina, as measured by the mixograph, indicates similar strength, rated as a 6 (on a scale of 1 to 8). Pasta processing tests show marked improvement in color and similar cooked weight and firmness to last year.

Buyers will be pleased with the consistent quality and processing performance of the 2005 crop. There are isolated pockets with lower vitreous kernel content and smaller kernel size due to heat stress prior to harvest, but these areas account for a small percentage of total production. As always, appropriate contract specifications are encouraged to ensure buyers receive the quality they need at the best value.

Cover photo: David Lipp, Fargo

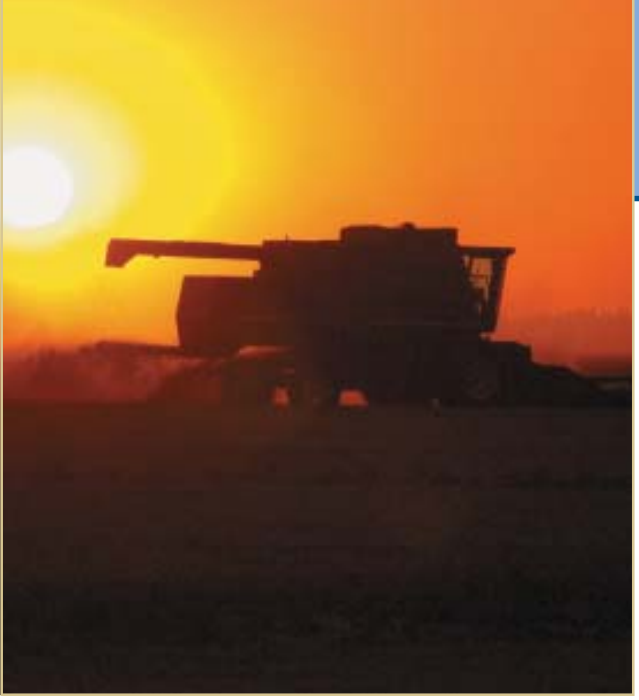
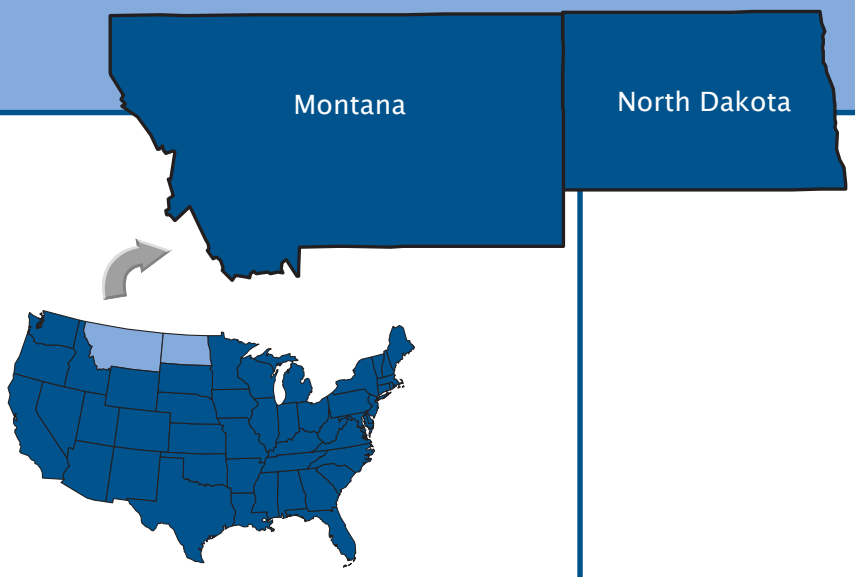


Photo credit: David Lipp, Fargo



SEASONAL CONDITIONS

PLANTING began in April in the southern part of the region and by early May in northern areas. Almost perfect weather and soil conditions allowed planting pace to advance ahead of average. By mid-May, over 60 percent of the durum crop was planted. Consistent progress through the end of May meant producers had nearly completed seeding by the first week of June.

GROWING conditions were beneficial early in the season as above normal precipitation and near normal temperatures boosted plant populations and crop development. Crop ratings and yield outlooks were very high at mid-season for all major growing areas. Temperatures in July were above normal, but rainfall continued to be adequate.

In some southern and western areas, an extreme increase in temperature during kernel fill in late July impacted yield and test weight. The warmer, drier period limited disease pressures in the north's denser production areas, further enhancing yield. Crop maturity accelerated, making an early harvest possible.

HARVEST began in early August in the south and progressed steadily northward through the month. Other than a few days of rainy weather in southern areas in mid-August, weather conditions were nearly ideal resulting in almost 75 percent of harvest being complete by the first week in September, three times the pace of 2004. By the end of September, the harvest was largely complete with the exception of a few northern areas.

DURUM WHEAT PRODUCTION

	2004	2005	2000-04 AVERAGE
MILLION BUSHELS			
Montana	18.0	15.8	14.1
North Dakota	52.8	68.3	58.6
Regional Total	**70.8**	**84.1**	**72.7**
U.S. Total	**89.9**	**100.0**	**92.0**
MILLION METRIC TONS			
Montana	0.49	0.43	0.38
North Dakota	1.44	1.86	1.59
Regional Total	**1.93**	**2.29**	**1.98**
U.S. Total	**2.45**	**2.72**	**2.50**

Source: USDA September 2005 Small Grains Summary

wheat characteristics

Wheat grades, as defined by the Federal Grain Inspection Service (FGIS) of the USDA Grain Inspection, Packers and Stockyards Administration (GIPSA), reflect the general quality and condition of a representative sample. U.S. grades are based on test weight and include limits on damaged kernels, foreign material, shrunken and broken kernels, and wheat of contrasting classes. Each determination is made on the basis of the grain when free from dockage and shrunken and broken kernels.

SUBCLASSES

Subclass is a separate marketing factor based on the number of kernels with a complete, hard and vitreous endosperm, the portion that makes semolina. For durum wheat the subclasses are:

- **Hard Amber Durum (HAD)**—at least 75 percent or more hard, vitreous kernels;
- **Amber Durum (AD)**— between 60 and 74 percent hard, vitreous kernels;
- **Durum (D)**—less than 60 percent hard, vitreous kernels.

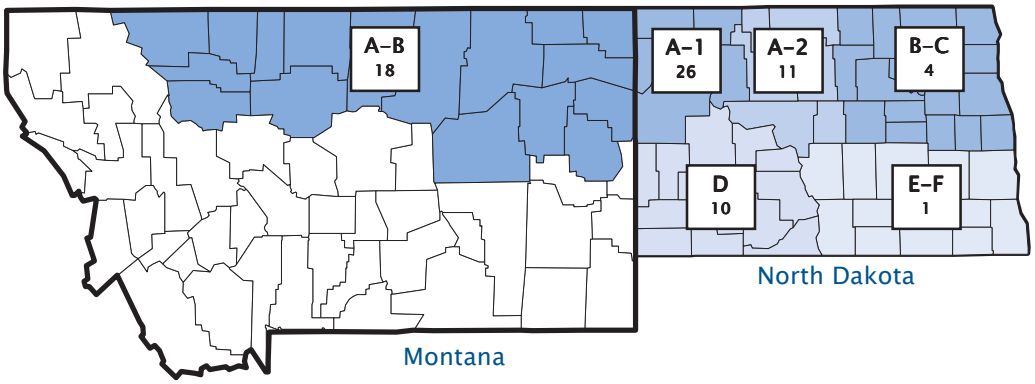
OFFICIAL U.S. GRADES AND GRADE REQUIREMENTS (Revised June 1993)

GRADING FACTORS	U.S. GRADES 1	2	3	4	5
DURUM—MINIMUM TEST WEIGHTS					
Pounds per bushel	60.0	58.0	56.0	54.0	51.0
Kilograms per hectoliter	78.2	75.6	73.0	70.4	66.5
MAXIMUM PERCENT LIMITS OF:					
Defects					
Damaged kernels					
Heat (part of total)	0.2	0.2	0.5	1.0	3.0
Total	2.0	4.0	7.0	10.0	15.0
Foreign material	0.4	0.7	1.3	3.0	5.0
Shrunken/ broken kernels	3.0	5.0	8.0	12.0	20.0
Total[1]	3.0	5.0	8.0	12.0	20.0
Wheat of other classes[2]					
Contrasting classes	1.0	2.0	3.0	10.0	10.0
Total[3]	3.0	5.0	10.0	10.0	10.0
Stones	0.1	0.1	0.1	0.1	0.1
MAXIMUM COUNT LIMITS OF:					
Other material					
Animal filth	1	1	1	1	1
Castor beans	1	1	1	1	1
Crotalaria seeds	2	2	2	2	2
Glass	0	0	0	0	0
Stones	3	3	3	3	3
Unknown foreign substances	3	3	3	3	3
Total[4]	4	4	4	4	4
Insect-damaged kernels in 100 grams	31	31	31	31	31

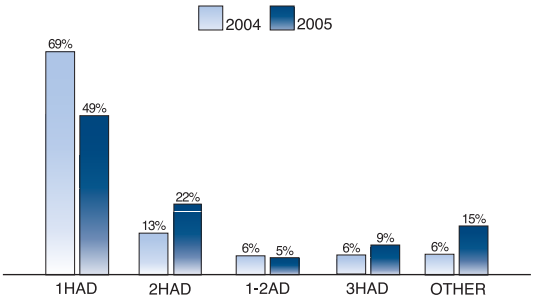
U.S. Sample grade is wheat that:
(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, or 5; or
(b) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or
(c) is heating or of distinctly low quality.
1 Includes damaged kernels (total), foreign material, and shrunken and broken kernels.
2 Unclassed wheat of any grade may contain not more than 10.0 percent of wheat of other classes.
3 Includes contrasting classes.
4 Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance.

Wheat samples were obtained in Montana and North Dakota in the crop reporting areas identified in color. Samples were gathered during harvest from growers, farm bins and country elevators.

CROP REPORTING AREAS & 2004 DURUM WHEAT PRODUCTION (million bushels)

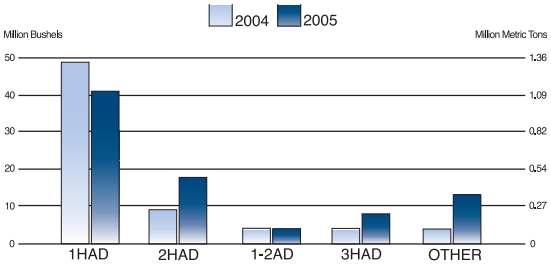


REGIONAL GRADE DISTRIBUTION



Seventy-one percent of 2005 samples grade No. 2 HAD or better.

REGIONAL QUANTITY ESTIMATES BY GRADE



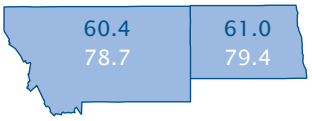
An estimated 60 million bushels (1.6 million metric tons) of the 2005 crop grade No. 2 HAD or better, similar to last year.

Photo credit: Wheat Foods Council

OVERALL GRADE

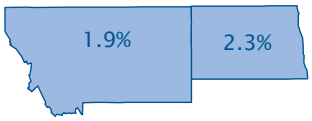
The average grade for the region is 1HAD. This grade is achieved with average test weight of 60.8 pounds per bushel (79.2 kg/hl), total defects of 2.2 percent and vitreous kernel content of 91 percent.

TEST WEIGHT BY STATE

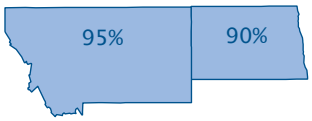


pounds/bushel
kilograms/hectoliter

AVERAGE TOTAL DEFECTS BY STATE



AVERAGE VITREOUS KERNELS BY STATE

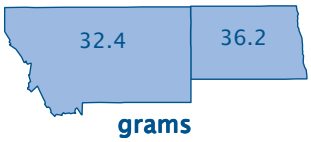


Wheat Grading Data

STATE AND CROP REPORTING AREA	TEST WEIGHT LBS/BU	TEST WEIGHT KG/HL	DAMAGE %	FOREIGN MATERIAL %	SHRUNKEN/ BROKEN KERNELS %	TOTAL DEFECTS %	CONTRASTING CLASSES %	U.S. GRADE	VITREOUS KERNELS %
MONTANA (A-B)									
State Avg. 2005	60.4	78.7	0.2	0.0	1.7	1.9	0.0	1HAD	95
State Avg. 2004	62.5	81.4	0.0	0.0	0.9	0.9	0.0	1HAD	91
NORTH DAKOTA									
Area A-1	61.7	80.3	0.2	0.0	1.0	1.2	0.0	1HAD	94
Area A-2	61.0	79.4	0.7	0.0	1.7	2.4	0.0	1HAD	94
Area B-C	59.0	76.9	5.9	0.0	1.9	7.8	0.4	3HAD	84
Area D	60.0	78.2	0.3	0.0	1.8	2.1	0.0	1HAD	76
Area E-F	58.5	76.2	4.2	0.0	1.7	5.9	0.0	3AD	73
State Avg. 2005	61.0	79.4	0.9	0.0	1.4	2.3	0.0	1HAD	90
State Avg. 2004	61.4	80.0	0.5	0.0	0.9	1.4	0.0	1HAD	89
TWO-STATE REGION									
Avg. 2005	60.8	79.2	0.8	0.0	1.4	2.2	0.0	1HAD	91
Avg. 2004	61.7	80.3	0.3	0.0	0.9	1.2	0.0	1HAD	89
Five-Year Avg.	60.0	78.2	2.0	0.1	1.5	3.6	0.2	2HAD	86

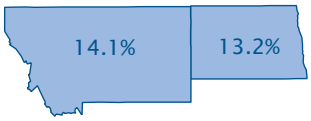
All state and regional averages have been adjusted to reflect production differences.

THOUSAND KERNEL WEIGHT BY STATE



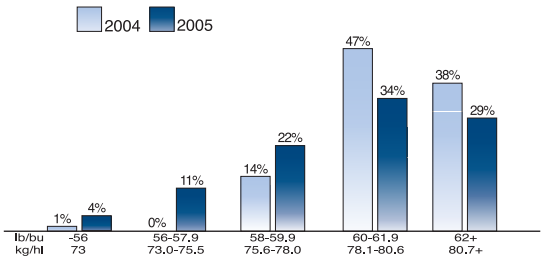
grams

AVERAGE PROTEIN BY STATE



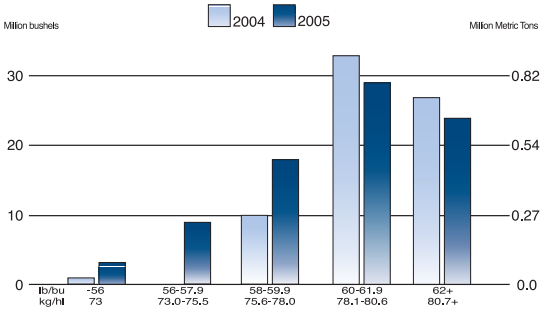
12% Moisture

REGIONAL TEST WEIGHT DISTRIBUTION



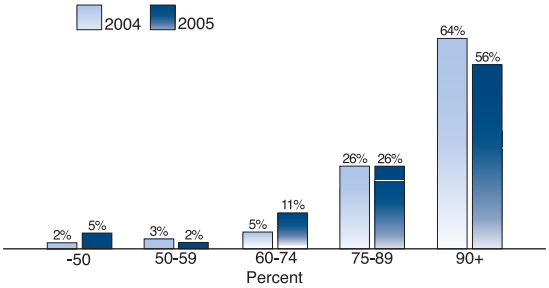
Sixty-three percent of 2005 samples have test weights of 60 lbs/bu (78.2 kg/hl) or greater. The regional average test weight is 60.8 lbs/bu (79.2 kg/hl), down from last year but up from the five-year average.

REGIONAL QUANTITY ESTIMATES BY TEST WEIGHT



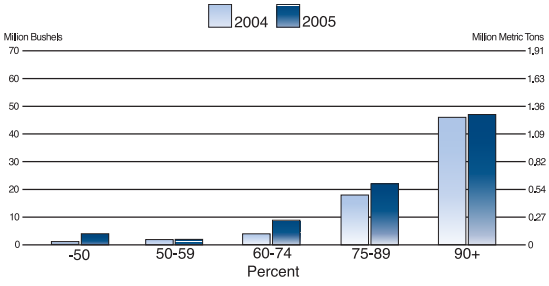
An estimated 53 million bushels (1.44 million metric tons) of the 2005 crop has a test weight of 60 lbs/bu (78.2 kg/hl) or greater.

REGIONAL VITREOUS KERNEL DISTRIBUTION



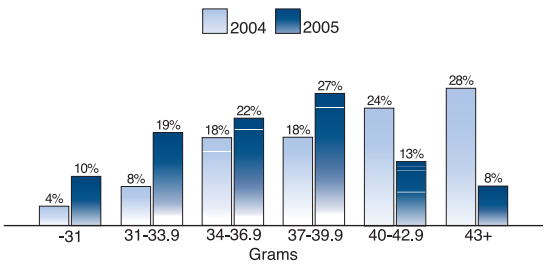
Eighty-two percent of 2005 samples have 75 percent or greater vitreous kernels. The average percentage of vitreous kernels in the regional crop is 91 percent.

REGIONAL QUANTITY ESTIMATE BY VITREOUS KERNEL CONTENT



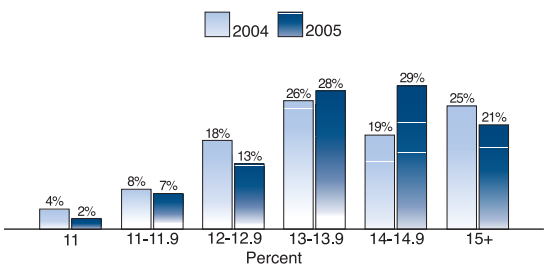
An estimated 69 million bushels (1.88 million metric tons) of this year's crop have at least 75 percent vitreous kernel content, up from 64 million bushels (1.75 million metric tons) in 2004.

REGIONAL THOUSAND KERNEL WEIGHT DISTRIBUTION



Seventy-one percent of 2005 samples have a thousand kernel weight of 34 grams or more.

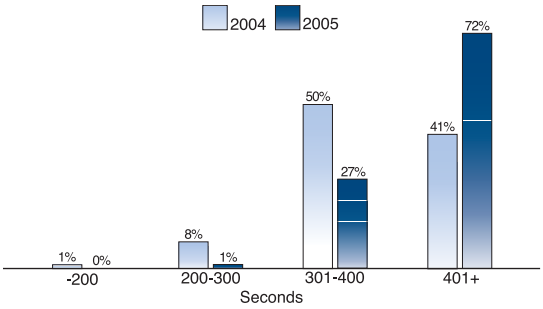
REGIONAL PROTEIN DISTRIBUTION (12% moisture basis)



Seventy-eight percent of 2005 samples have a protein content of 13.0 percent or greater.

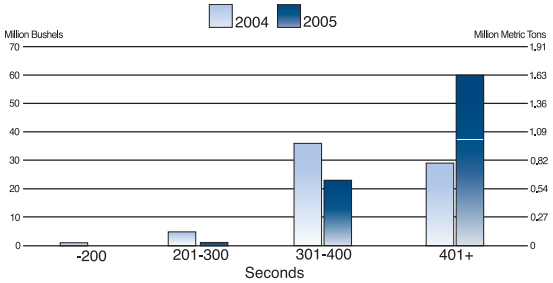
Photo credit: David Lipp, Fargo

REGIONAL FALLING NUMBER DISTRIBUTION



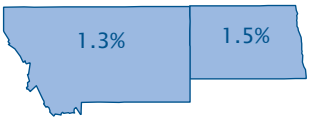
Nearly all samples of the 2005 crop have a falling number of 300 seconds or better.

REGIONAL QUANTITY ESTIMATE BY FALLING NUMBER

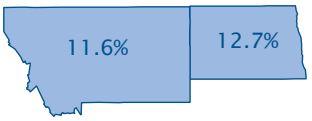


The quantity of sound durum available should be about 30 percent greater this year.

AVERAGE HARVEST DOCKAGE BY STATE



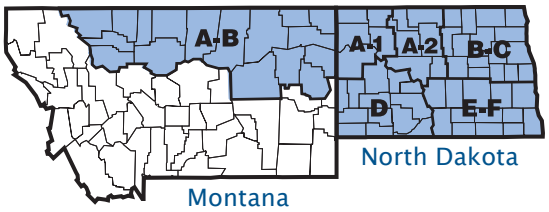
AVERAGE MOISTURE BY STATE



Other Kernel Quality Data

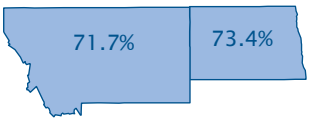
STATE AND CROP REPORTING AREA	DOCKAGE %	MOISTURE %	1000 KERNEL WEIGHT G	KERNEL DIST. MEDIUM %	KERNEL DIST. LARGE %	PROTEIN (DRY MATTER) %	PROTEIN (12% MOISTURE) %	WHEAT ASH %	FALLING NUMBER (SEC)	SEDIMENT-ATION (CC)
MONTANA (A-B)										
State Avg. 2005	1.3	11.6	32.4	81	33	16.0	14.1	1.64	387	48
State Avg. 2004	1.3	12.2	40.2	36	59	14.4	12.7	1.43	369	48
NORTH DAKOTA										
Area A-1	1.3	12.7	37.3	51	56	14.4	12.7	1.61	380	44
Area A-2	1.4	13.2	35.6	52	57	15.0	13.2	1.68	373	42
Area B-C	1.5	13.2	33.4	62	48	15.7	13.9	1.84	354	40
Area D	2.1	12.0	35.6	59	51	16.4	14.4	1.79	383	50
Area E-F	2.2	12.8	31.1	70	43	15.8	13.9	1.82	374	43
State Avg. 2005	1.5	12.7	36.2	54	54	15.0	13.2	1.68	376	44
State Avg. 2004	1.1	12.5	40.2	37	60	15.4	13.6	1.53	352	50
FOUR-STATE REGION										
Avg. 2005	1.5	12.5	35.5	40	51	15.2	13.4	1.67	378	45
Avg. 2004	1.2	12.5	40.2	36	60	15.2	13.4	1.50	356	49
Five-Year Avg.	1.3	11.5	36.2	41	52	16.0	14.1	1.62	322	46

All state and regional averages have been adjusted to reflect production differences.



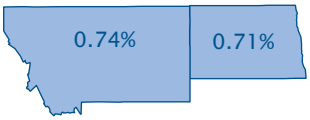
milling characteristics

AVERAGE TOTAL EXTRACTION BY STATE



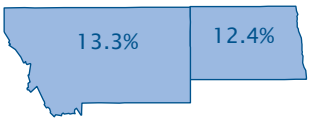
AVERAGE SEMOLINA EXTRACTION BY STATE

AVERAGE ASH CONTENT BY STATE



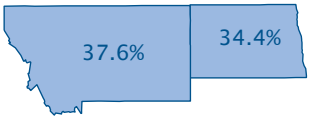
14% Moisture Basis

AVERAGE SEMOLINA PROTEIN CONTENT BY STATE



14% Moisture Basis

AVERAGE WET GLUTEN CONTENT BY STATE



14% Moisture Basis

Total extraction represents the portion of the kernel that can be milled into flour and semolina. Semolina extraction is the portion milled into semolina only.

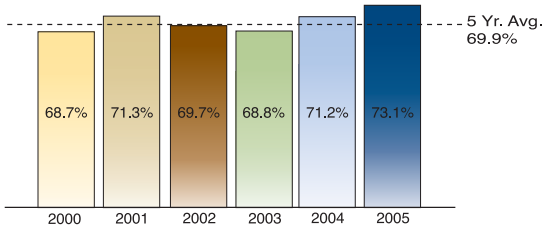
Ash content in the endosperm of durum is inherently higher than in the endosperm of other hard wheats, but can still be used as a relative measure of bran or mineral content in the flour and semolina.

Specks appear in semolina when small particles of bran or other material escape the cleaning and purifying process. Millers can control speck count by selecting durum that is free of disease and foreign material, thoroughly cleaning the durum, properly tempering and conditioning the wheat before milling, and by using purifiers to remove small bran particles from the semolina.

Protein content in semolina has a high correlation with gluten content and, in turn, mechanical strength and cooking quality. Wet gluten is a quantitative measure of the gluten forming proteins in semolina that are primarily responsible for its mechanical strength and pasta quality.

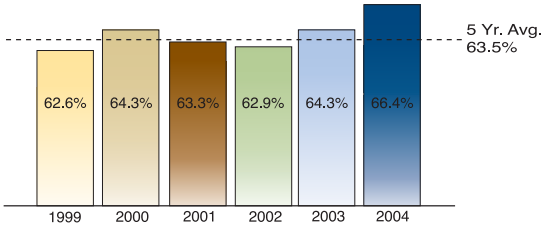
Mixogram curves reveal important information about the gluten quality of semolina and ultimately about the potential cooked firmness of pasta. Mixograms are rated on a scale of 1 to 8, with the higher values indicating strong mixing characteristics.

REGIONAL AVERAGE: TOTAL EXTRACTION



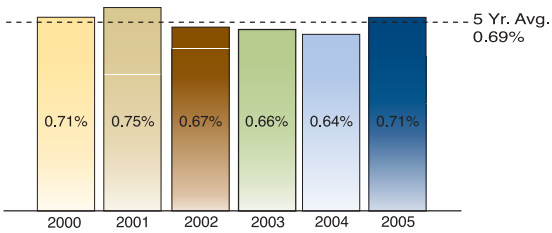
The regional average is 73.1 percent, up from last year's 71.2 percent and the five-year average of 69.9 percent.

REGIONAL AVERAGE: SEMOLINA EXTRACTION



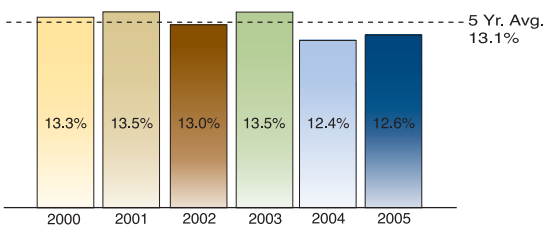
The regional average is 66.4 percent, up from last year's 64.3 percent and the five year average of 63.5 percent.

REGIONAL AVERAGE: ASH CONTENT



The 2005 crop produced semolina with an average ash content of 0.71 percent, higher than last year and the five-year average.

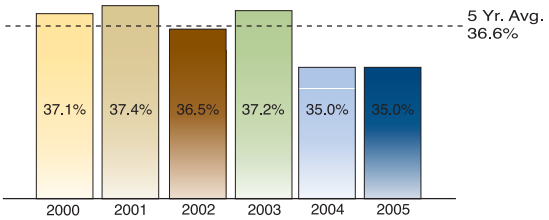
REGIONAL AVERAGE: SEMOLINA PROTEIN CONTENT



The 2005 crop produced semolina with an average protein content of 12.6 percent, higher than last year but lower than the five-year average.

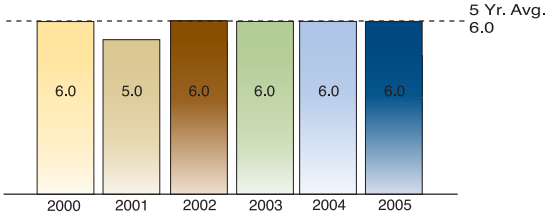
Photo credit: Wheat Foods Council

REGIONAL AVERAGE: WET GLUTEN



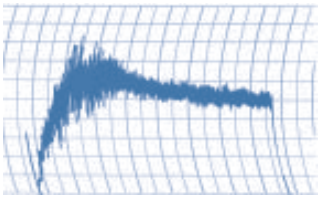
Average wet gluten content for the 2005 crop is 35.0 percent, the same as last year but lower than the five-year average.

REGIONAL AVERAGE: MIXOGRAM CLASSIFICATION



The regional average mixogram score is 6.0 (on a scale of 1 to 8), the same as last year and the five-year average.

REGIONAL AVERAGE MIXOGRAM



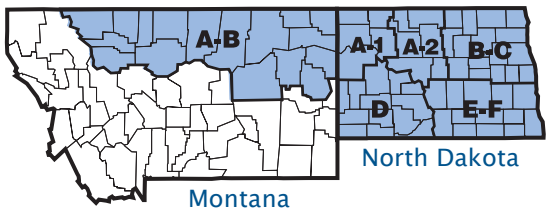
A 6.0 mixogram classification on a scale of 1 to 8 indicates strength.

Semolina Quality Data

STATE AND CROP REPORTING AREA	TOTAL EXTRACTION %	SEMOLINA EXTRACTION %	ASH %	SPECKS NO/10 SQ IN	PROTEIN %	WET GLUTEN %	MIXOGRAM[1] CLASSIFICATION SCALE 1-8
MONTANA (A-B)							
State Avg. 2005	71.7	66.0	0.74	17	13.3	37.6	6
State Avg. 2004	71.7	64.8	0.61	13	11.8	33.3	5
NORTH DAKOTA							
Area A-1	74.9	67.7	0.67	20	12.0	33.0	5
Area A-2	73.1	66.1	0.71	23	12.4	33.8	6
Area B-C	71.7	64.7	0.81	20	12.8	34.5	6
Area D	70.5	64.3	0.75	13	13.5	39.0	6
Area E-F	71.3	64.5	0.78	27	12.9	37.5	6
State Avg. 2005	73.4	66.4	0.71	20	12.4	34.4	5
State Avg. 2004	71.0	64.1	0.65	22	12.7	35.6	6
TWO-STATE REGION							
Average 2005	73.1	66.4	0.71	19	12.6	35.0	6
Average 2004	71.2	64.3	0.64	20	12.4	35.0	6
5-Year Average	69.9	63.5	0.69	22	13.1	36.6	6

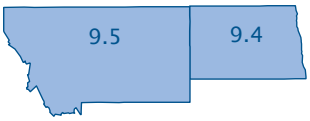
Note: All state and regional averages have been adjusted to reflect production differences.

[1]See reference mixograms for durum wheat on page 15.



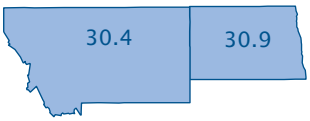
pasta characteristics

AVERAGE COLOR SCORE BY STATE



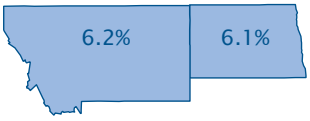
scale of 1 to 12

AVERAGE COOKED WEIGHT BY STATE

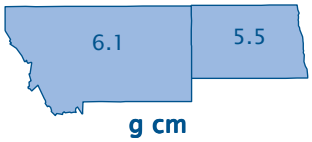


grams

AVERAGE COOKING LOSS BY STATE



AVERAGE COOKED FIRMNESS BY STATE



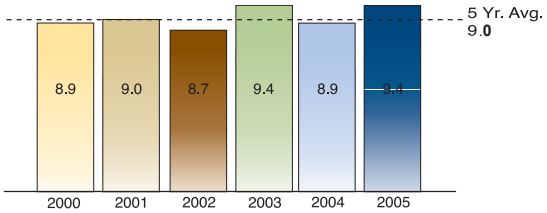
g cm

Dry pasta processors want a finished product that is visually appealing, elastic and strong enough to resist breakage during cutting, packaging, handling and shipping, able to withstand the rigors of cooking, and satisfying to the consumer palate.

Yellow color in semolina and pasta is a traditional, rather than functional, mark of quality. In the early days of the pasta industry, before sophisticated testing evolved, consumers assumed that a yellow pasta was made from durum wheat, which is known to make pasta with superior cooking quality compared to that made from other hard wheats.

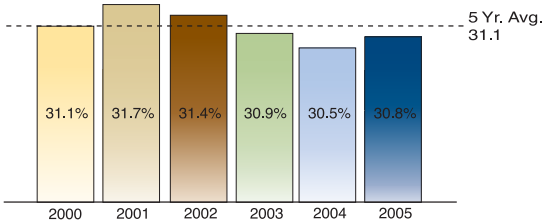
Most consumers prefer pasta that is "al dente," meaning it has some firmness to the bite. Good quality pasta that is cooked according to package directions should not be sticky or mushy when eaten.

REGIONAL AVERAGE: COLOR SCORE



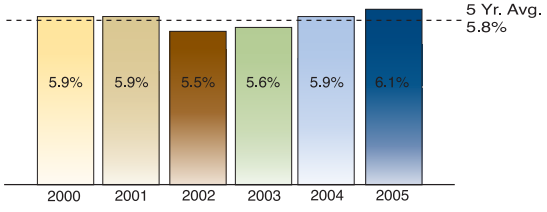
The regional average color score is 9.4, improved over 2004 and the average. Pasta samples with scores of 8.0 or higher have good color.

REGIONAL AVERAGE: COOKED WEIGHT (grams)



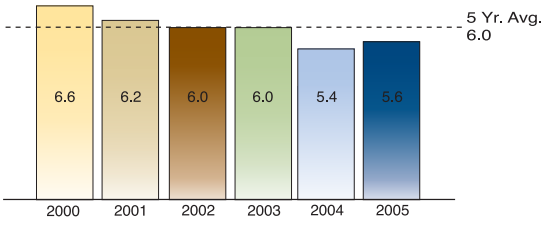
The regional average cooked weight is 30.8 grams, above last year but lower than the five-year average.

REGIONAL AVERAGE: COOKING LOSS



The regional average cooking loss is 6.1 percent, higher than last year and the five-year average.

REGIONAL AVERAGE: COOKED FIRMNESS (g cm)



The regional average cooked firmness is 5.6 g cm, higher than last year but lower than the five-year average.

Photo credit: USDA Agricultural Research Service

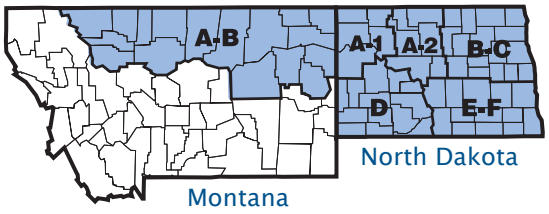
Photo: Wheat Foods Council

Photo: Wheat Foods Council

Spaghetti Processing Properties

STATE AND CROP REPORTING AREA	COLOR SCORE (1-12)	COOKED WEIGHT G	COOKING LOSS %	COOKED FIRMNESS G CM
MONTANA (A-B)				
State Avg. 2005	9.5	30.4	6.2	6.1
State Avg. 2004	9.0	29.3	6.1	5.0
NORTH DAKOTA				
Area A-1	9.5	31.1	6.1	5.3
Area A-2	9.5	31.4	5.9	5.6
Area B-C	8.5	30.4	6.4	5.5
Area D	9.5	29.9	6.0	6.0
Area E-F	8.5	30.2	6.3	5.5
State Avg. 2005	9.4	30.9	6.1	5.5
State Avg. 2004	8.9	30.8	5.9	5.5
TWO-STATE REGION				
Avg. 2005	9.4	30.8	6.1	5.6
Avg. 2004	8.9	30.5	5.9	5.4
Five-Year Avg.	9.0	31.1	5.8	6.0

Note: All state and regional averages have been adjusted to reflect production differences.



summary information

Average Quality Factors for the Great Plains Durum Wheat Crop 2000–2005

	2000	2001	2002	2003	2004	FIVE-YEAR AVERAGE	2005
GRADING DATA							
Test Weight (lbs/bu)	58.8	58.8	59.9	61.0	61.7	60.0	60.8
(kg/hl)	76.6	76.6	78.0	79.4	80.3	78.2	79.2
Total Defects (%)	6.8	5.0	3.3	1.6	1.2	3.6	2.2
Vitreous Kernels (%)	75	88	85	92	89	86	91
Grade	3HAD	2HAD	2HAD	1HAD	1HAD	2HAD	1HAD
OTHER WHEAT DATA							
Dockage (%)	1.5	1.5	1.7	0.7	1.2	1.3	1.5
Protein: 12% Moisture (%)	14.3	14.4	14.0	14.5	13.4	14.1	13.4
1000 Kernel Weight (gm)	33.6	36.7	36.9	33.8	40.2	36.2	35.5
Ash (%)	1.71	1.82	1.56	1.53	1.50	1.62	1.67
Falling Number (sec)	216	355	292	391	356	322	378
Sedimentation (mm)	44	42	46	51	49	46	45
SEMOLINA DATA							
Total Extraction (%)	68.7	71.3	69.7	68.8	71.2	69.9	73.1
Semolina Extraction (%)	62.6	64.3	63.3	62.9	64.3	63.5	66.4
Ash (%)	0.71	0.75	0.67	0.66	0.64	0.69	0.71
Specks (no/10 sq in)	20	32	26	12	20	22	19
Protein (%)	13.3	13.5	13.0	13.5	12.4	13.1	12.6
Wet Gluten (%)	37.1	37.4	36.5	37.2	35.0	36.6	35.0
Mixograph Classification	6	5	6	6	6	6	6
SPAGHETTI PROCESSING DATA							
Color Score (scale of 1–12)	8.9	9.0	8.7	9.4	8.9	9.0	9.4
Cooked Weight (gm)	31.1	31.7	31.4	30.9	30.5	31.1	30.8
Cooking Loss (%)	5.9	5.9	5.5	5.6	5.9	5.8	6.1
Cooked Firmness (g cm)	6.6	6.2	6.0	6.0	5.4	6.0	5.6

Photo credit:
David Lipp, Fargo, N.D.

export cargo sampling

Export Cargo Data

	2003	2004
SAMPLE COUNT	23	20
GRADING DATA		
Test Weight (lbs/bu)	60.8	60.8
Test Weight (kg/hl)	79.2	79.2
Damaged Kernels (%)	2.5	2.2
Foreign Material (%)	0.2	0.2
Shrunken & Broken (%)	1.6	1.2
Total Defects (%)	4.4	3.6
Vitreous Kernels (%)	84	81
Grade	2HAD	2HAD
OTHER WHEAT DATA		
Dockage (%)	0.6	0.5
Moisture (%)	11.1	12.6
Protein: 12% Moisture (%)	14.4	13.5
Protein: Dry (%)	16.3	15.3
Ash: 14% Moisture (%)	1.58	1.52
Ash: Dry (%)	1.83	1.77
1000 Kernel Weight (g)	35.4	38.4
Kernel Size (%) lg/md/sm	44/49/9	57/38/5
Falling Number (sec)	376	350
SEMOLINA DATA		
Total Extraction (%)	69.1	71.8
Semolina Extraction (%)	62.3	64.6
Ash: 14% Moisture (%)	0.67	0.65
Ash: Dry (%)	0.78	0.76
Specks (no/10 sq in)	16.3	17.2
Protein: 14% Moisture (%)	13.4	12.5
Protein: Dry (%)	15.6	14.6
Mixograph Classification (scale of 1-8)	5.3	5.7
Color: L (white-black)	84.9	84.8
a (red-green)	-2.6	-2.6
b (yellow-blue)	25.9	24.0
SPAGHETTI PROCESSING DATA		
Color Score (scale of 1-12)	9.0	8.4
Cooked Weight (gm)	30.8	30.9
Cooking Loss (%)	5.5	6.0
Cooked Firmness (g cm)	5.9	5.3

Data contained in previous sections of this report are derived from the testing of samples gathered during harvest from origination points throughout the northern U.S. durum growing region. The results provide an assessment of the overall quality of the crop produced in a given year.

Photo credit:
USDA Agricultural Research Service

U.S. Wheat Associates, the export market development arm for American wheat growers, furthers this information by commissioning an export cargo sampling program. The program provides an accurate representation of the supplies moving through the grain marketing and transportation system and actually reaching export points. Results show the quality levels at which U.S. wheat is realistically traded and are useful to customers in developing reasonable purchase specifications.

The Federal Grain Inspection Service oversees the program whereby all export inspection agencies at all ports collect every tenth sublot sample from every vessel of U.S. wheat shipped during three two-month time periods annually.

The durum wheat samples are sent for analysis to the Durum Wheat Quality and Pasta Processing Laboratory in the North Dakota State University Plant Science Department.

laboratory analysis

All quality data contained in this report is the result of testing and analysis conducted by or under the supervision of Dr. Frank A. Manthey, assistant professor, and Brent L. Hinsz, food technologist; of the Durum Wheat Quality and Pasta Processing Laboratory in the Department of Plant Science at North Dakota State University, Fargo, USA.

COLLECTION The North Dakota and Montana state offices of the National Agricultural Statistics Service obtained durum wheat samples during harvest directly from growers, farm bins and local elevators. These samples reflect the condition of the grain at the point of origin. Collection began the week of August 8 when approximately 6 percent of North Dakota's durum crop had been harvested and continued until September 16 when harvest was 88 percent complete. A total of 233 samples were collected during harvest from Montana (52) and North Dakota (181).

ANALYSIS Half of the total wheat samples collected were analyzed for grade and other physical kernel characteristics. The data obtained from the analyses were used to generate frequency distributions as a percentage of the harvested crop. Distribution results may differ from data presented in the various tables, because the latter are derived from production adjusted averages, rather than simple averages.

All samples received in the laboratory were sub-sampled to obtain one composite sample for each of the five areas in North Dakota and one composite for Montana. These were analyzed for grade and physical characteristics as well as milling performance and spaghetti processing qualities. Again, all state and regional averages have been adjusted to reflect production as opposed to simple averaging.

Photo credit: North Dakota State University

methods, terms & symbols

Photo credit: North Dakota Mill

WHEAT

SAMPLE COLLECTION Each sample contained approximately 2 to 3 pounds of wheat, stored in securely closed, moisture proof plastic bags.

MOISTURE Official USDA procedure using Motomco Moisture Meter.

GRADE Official United States Standards for Grain, as determined by a licensed grain inspector. North Dakota Grain Inspection Service, Fargo, ND, provided grades for composite wheat samples representing each crop reporting area.

VITREOUS KERNELS Approximate percentage of kernels having vitreous endosperm, based on weights.

DOCKAGE Official USDA procedure. All matter other than wheat which can be removed readily from a test portion of the original sample by use of an approved device (Carter Dockage Tester). Dockage may also include underdeveloped, shriveled and small pieces of wheat kernels removed in properly separating the material other than wheat and which cannot be recovered by properly rescreening or recleaning.

TEST WEIGHT American Association of Cereal Chemists Method 55-10 approved April 1961, revised October 1999. Measured as pounds per bushel (lb/bu), Kilograms per hectoliter (Kg/h) = (lbs/bu X 1.292) + 0.630. Approved Methods of the American Association of Cereal Chemists, Cereal Laboratory Methods (10th Edition), St. Paul, MN (2000).

THOUSAND KERNEL WEIGHT Based on 10 gram sample of cleaned wheat (free of foreign material and broken kernels) counted by electronic seed counter.

KERNEL SIZE DISTRIBUTION Determinations made according to the procedure described in Cereal Science Today 5:(3), 71 (1960). Kernels remaining over a Tyler No. 7 (2.92 mm opening) are classified as “large;” kernels passing through the top sieve but remaining on a Tyler No. 9 (2.24 mm opening) are classified as “medium” size kernels. Kernel passing through the second sieve are classed as “small.” Size is reported as percentage of large, medium, and small kernels.

PROTEIN American Association of Cereal Chemists (AAC) Method: 46-30 (Combustion Method), expressed on dry basis and 12 percent moisture basis.

Photo credit: North Dakota Mill

Photo credit: USDA Agricultural Research Service

ASH American Association of Cereal Chemists Method 08-01, approved April 1961, revised October 1999; expressed on a 14 percent moisture basis.

FALLING NUMBER American Association of Cereal Chemists Method 56-81B, approved November 1972, revised September 1999; units of seconds (14 percent moisture basis).

MICRO SEDIMENTATION Determined as described by Dick, J.W. and Quick, J.S. Cereal Chem. 60(4):315-318, 1983.

WET GLUTEN American Association of Cereal Chemists Method 38-12, approved October 1999; expressed on a 14 percent moisture basis determined with the glutomatic instrument.

SEMOLINA

EXTRACTION AACC Method 26-41 (modified for the Buhler Mill). Expressed on a total product basis.

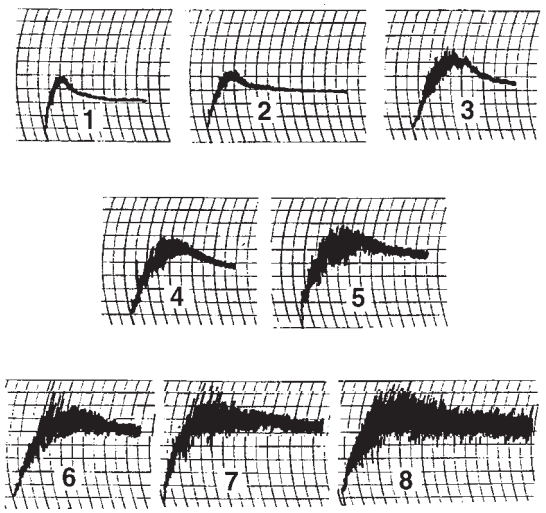
ASH AACC Method 08-01, approved April 1961, revised October 1999; expressed on a 14 percent moisture basis.

PROTEIN AACC Method 46-30 (combustion method), approved September 1995, revised October 1999, N x 5.7, expressed on a 14 percent moisture basis.

SPECKS The number of specks in semolina was determined on a flat surface under a constant light source, and counting the visible specks (brown and black particles) in three different one-inch square areas. The average of the three readings was converted to the number of specks per 10 square inches.

MIXOGRAPH Mixograph evaluation of semolina was performed according to the AACC Method 54-40A with some modifications: Ten grams of semolina (weighed on 14 percent moisture basis) were mixed for 8 min at constant water absorption of 5.8 ml, using a spring setting of 8. The mixograms were scored by comparing them to reference mixograms. A scale of 1 to 8 is employed, higher values indicate strong mixing characteristics (see reference mixogram chart).

REFERENCE MIXOGRAMS FOR DURUM WHEAT



SPAGHETTI

PROCESSING Pasta was made using the laboratory procedure described by Walsh, Ebeling, and Dick, *Cereal Sci. Today*: 16(11) 385, 1971. A 1-Kg semolina was mixed with the appropriate amount of water that gave a dough consistency of 32 percent total water absorption. The other processing conditions used were: Water temperature, 40 C, extruder shaft speed, 25 rpm and vacuum, 18 in. Hg; the dough was pressed through an 84-strand teflon-coated spaghetti die with 0.157 cm openings. The extruded spaghetti samples were dried at high temperature for 12 hrs, using maximum temperature and relative humidity of 73 C and 83 percent respectively.

COLOR Color scores were determined by light reflectance (AACC Method 14-22, 1983), using a Minolta Color Difference Meter (Model CR 310, Minolta Camera Co., Japan). The scores were generated according to the new color map designed by Debbouz (Pasta J. vol 6, No 6, 1994). A spaghetti sample with a score of 8.0 or higher is considered to have good color.

COOKED WEIGHT AACC Method 66-50 with some modifications: 10 g of dry spaghetti were placed in 300 ml boiling distilled water and cooked for 12 min. The cooked and drained spaghetti sample was weighed and the results were reported in grams.

COOKING LOSS AACC Method 66-50. Solids lost to the cooking water. After drying the residue was weighed and reported as percentage of the original dry sample.

FIRMNESS AACC Method 66-50 with a plexiglass tooth attached to a Texture Analyzer (Model TA-XT2, Texture Technology Corp., Scarsdale, New York).

Photo credit: North Dakota Mill

Photo credit: USDA Agricultural Research Service

varietal information

Quality products begin with quality ingredients. In the case of wheat, quality begins with the varieties planted. Within the durum class of wheat, there are different varieties available—all with relatively uniform characteristics. A public plant breeder at North Dakota State University in Fargo develops and releases most of the durum varieties grown in the northern region, although some private firms also have durum breeding programs. Before any durum variety is released to the public, it must meet or exceed current standards for the class. Prospective releases are evaluated for milling and pasta characteristics as well as for yield, protein content, test weight, resistance to diseases and insects, and straw strength.

Popular and New Durum Wheat Varieties

VARIETY	AGENT[1] OR ORIGIN	YEAR RELEASED	AGRONOMIC DESCRIPTION			REACTION TO DISEASE[2]		3 YR. AVERAGE YIELD EASTERN[3]		3 YR. AVERAGE YIELD WESTERN[4]	
			HEIGHT	STRAW STRENGTH	MATURITY	FOLIAR DISEASE	HEAD (SCAB)	N.D. BU/ACRE	N.D. MT/HA	N.D. BU/ACRE	N.D. MT/HA
Ben	ND	1996	med.	strg.	med.	MR	S*	71.8	4.83	46.4	3.12
Dilse	ND	2002	med.	strg.	late	M	MS	69.2	4.65	46.8	3.13
Lebsock	ND	1999	med.	strg.	med.	M	MS	75.1	5.05	46.9	3.15
Maier	ND	1998	med.	strg.	m-late	M	S*	65.7	4.42	45.6	3.07
Mountrail	ND	1998	med.	strg.	late	M	S*	76.1	5.12	47.3	3.18
Munich	ND	1995	med.	v.strg.	med.	MR	S*	NA	NA	44.7	3.01
Pierce	ND	2001	med.	m.strg.	med.	MS	S	72.1	4.85	46.7	3.14
Plaza	ND	1999	s.dwf.	strg.	late	M	MS	69.6	4.68	44.9	3.02
Renville	ND	1988	tall	med.	med.	M	S*	69.5	4.67	44.5	2.99
TOP MONTANA VARIETIES (Based on Williston test plot in northwest North Dakota)											
AC Avonlea	Canada	1997	med.	med.	med.	M	S	NA	NA	43.5[8]	2.92
Kyle	Canada	1984	tall	weak	med.	M	n/a	NA	NA	44.4	2.98
Lebsock	ND	1999	med.	strg.	med.	M	MS	NA	NA	45.9[8]	3.09
Mountrail	ND	1998	med.	strg.	late	M	S*	NA	NA	44.9[8]	3.02

Source: 2004 North Dakota Durum Wheat Variety Performance Descriptions

1 ND-North Dakota State University, Canada-Agriculture Canada

2 Reaction to Disease: resistant (R), moderately resistant (MR), intermediate (M), moderately susceptible (MS), susceptible (S), very susceptible (VS). *Indicates yield and/or quality have often been higher than would be expected based on visual head blight symptoms alone.

3 2002-04 data from Carrington and Langdon locations in North Dakota.

4 2002-04 data from Minot, Williston, Dickinson and Hettinger locations in North Dakota.

Photo credit: David Lipp, Fargo, N.D.

QUALITY FACTORS[5]										
TEST WEIGHT LB/BU	TEST WEIGHT KG/HL	LARGE KERNELS %	FALLING NUMBER SEC.	WHEAT[6] PROTEIN %	SEMOLINA EXTRACTION (%)	MIXOGRAM SCORE (1-8)	PASTA COLOR (1-12)	COOKED FIRMNESS G CM	OVERALL[7] QUALITY RATING	VARIETY
61.2	79.7	67	388	14.6	63.5	6	8.9	6.5	excellent	Ben
60.7	79.1	55	376	15.3	63.5	7	9.1	7.4	excellent	Dilse
61.6	80.2	61	399	14.1	63.5	6	9.0	6.3	good	Lebsock
60.7	79.1	57	404	14.9	63.4	7	9.2	7.2	excellent	Maier
60.4	78.7	51	404	14.1	62.7	5	8.8	6.2	average	Mountrail
60.0	78.2	51	387	14.4	63.0	5	9.3	6.4	good	Munich
61.5	80.1	54	396	14.3	62.1	7	9.3	6.5	good	Pierce
60.1	78.3	50	410	14.1	63.0	6	8.9	6.1	average	Plaza
60.5	78.8	51	385	14.5	63.7	6	9.1	6.7	good	Renville
60.6	78.9	47	473	15.3	62.2	6	9.6	7.2	good[9]	AC Avonlea
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Kyle
62.1	80.9	45	382	13.9	63.7	6	9.4	6.7	good[9]	Lebsock
61.0	79.4	32	398	13.9	62.1	6	9.3	6.6	average[9]	Mountrail

5 Source: NDSU Plant Science Department, Durum Wheat Quality and Pasta Processing Laboratory. Five-year average data from field plot trials (2000-04).

6 Wheat protein content expressed on 12 percent moisture basis.

7 Based on protein content, kernel attributes, and milling and spaghetti processing performance.

8 2002-04 data only from Williston, N.D.

9 2000-04 quality data only from Williston, N.D.

NORTH DAKOTA

Leading durum varieties planted in North Dakota in 2005 are Lebsock, Mountrail and Ben. Together the top three varieties account for 70 percent of planted acres in 2005. These are among the highlights of a June survey conducted by USDA's North Dakota Agricultural Statistics Service.

LEBSOCK remained the top durum variety in North Dakota in 2005, holding 28 percent of acres, equal to 2004. It also advanced to fourth place in Montana with 5 percent of the acres. Lebsock enjoys broad appeal across North Dakota but is most dominant in central and eastern production zones. It has good disease tolerance, is one of the highest yielding varieties statewide and has good end-use quality.

MOUNTRAIL is the leading variety in Montana and is second in North Dakota, at 51 and 26 percent of acres, respectively. It made gains in both states from 2004 as the leading variety in the major production areas of northwest North Dakota and northeast Montana where it has proven to be the highest yielder. Mountrail is rated average for end-use quality.

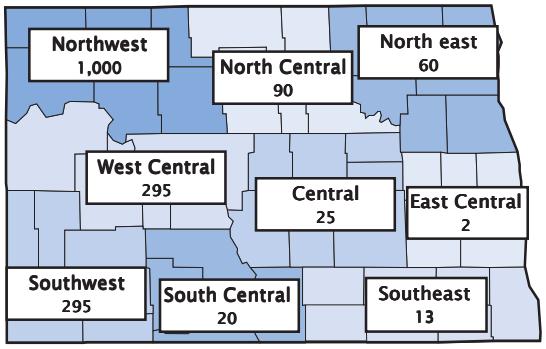
BEN continues to decline in acreage in North Dakota, but remains third with 16 percent of acres. It is dominant in southwest North Dakota. Ben has excellent end-use quality and the highest tolerance to foliar diseases.

DURUM WHEAT VARIETIES PLANTED ACRES IN NORTH DAKOTA

VARIETY	2004 %[1]	2005 %[1]	2005 ACRES (1,000)
Lebsock	27.9	28.3	509.1
Mountrail	21.3	25.5	459.7
Ben	20.2	16.4	295.0
Pierce	2.9	6.4	114.7
Kyle	4.1	4.0	72.0
Renville	3.7	3.0	53.1
Maier	3.7	2.6	46.1
Dilse	2.0	2.5	45.0
Plaza	1.1	2.0	36.0
Munich	1.4	1.9	34.3
Vic	1.5	1.2	22.3
Monroe	4.2	1.1	20.7
Ward	0.8	1.0	17.1
Other[2]	5.4	4.1	74.8
All Varieties	100.0	100.0	1800.0[3]

1/ Percentages may not add to 100 due to rounding.
2/ Other includes other varieties not listed and unknown varieties.
3/ Based on June 2005 survey. September 30 estimate is 1.98 million acres.

NORTH DAKOTA AGRICULTURAL STATISTICS DISTRICTS 2005 PLANTED AREA (1,000 ACRES)



DURUM WHEAT VARIETIES IN NORTH DAKOTA SHARE OF 2005 PLANTINGS BY CROP DISTRICT

VARIETY	NORTH WEST	NORTH CENTRAL	NORTH EAST	WEST CENTRAL	CENTRAL	EAST CENTRAL	SOUTH WEST	SOUTH CENTRAL	SOUTH EAST	TOTAL STATE
					PERCENTAGE (%)[1]					
Lebsock	23.6	60.1	66.1	27.1	66.2	31.8	22.1	30.4	86.0	28.3
Mountrail	42.8	0.0	0.0	10.0	7.8	0.0	0.0	0.0	0.0	25.5
Ben	6.5	7.8	1.6	15.2	9.7	68.2	58.8	0.0	0.0	16.4
Pierce	5.4	21.2	2.3	9.0	13.6	0.0	3.0	0.0	11.9	6.4
Kyle	7.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.0
Renville	2.5	0.0	0.0	5.1	2.8	0.0	1.4	43.2	0.0	3.0
Maier	2.1	2.4	0.0	3.1	0.0	0.0	4.5	0.0	0.0	2.6
Dilse	1.4	0.0	0.0	6.8	0.0	0.0	3.6	0.0	0.0	2.5
Plaza	0.1	0.0	0.0	11.8	0.0	0.0	0.0	0.0	0.0	2.0
Munich	2.8	0.0	8.2	0.6	0.0	0.0	0.0	0.0	0.0	1.9
Vic	1.4	0.0	0.0	1.1	0.0	0.0	1.8	0.0	0.0	1.2
Monroe	1.8	0.0	0.0	0.8	0.0	0.0	0.0	0.0	2.1	1.1
Ward	0.4	2.5	0.0	1.0	0.0	0.0	2.7	0.0	0.0	1.0
Other[2]	2.0	6.0	21.8	8.3	0.0	0.0	2.1	26.4	0.0	4.2
					1,000 ACRES					
All Varieties	1,000	90	60	295	25	2	295	20	13	1,800

1/ Percentages may not add to 100 due to rounding.
2/ Other includes other varieties not listed and unknown varieties.
3/ Based on June 2005 survey. September 30 estimate is 1.98 million acres.

Photo credit: David Lipp, Fargo, N.D.

MONTANA

A survey conducted by USDA's Montana Agricultural Statistics Service shows the most popular varieties of durum wheat continue to be Mountrail, Kyle, AC Avonlea and Lebsock. Of the 570,000 acres planted in the state, these four varieties account for 83 percent.

KYLE remains the second ranked variety in Montana with 21 percent of acres, down sharply from 34 percent in 2004. Kyle has good end-use quality with competitive yields, but is a tall variety with weak straw. In higher rainfall and high yield years such as 2004, medium height varieties with stronger straw tend to stand better through harvest.

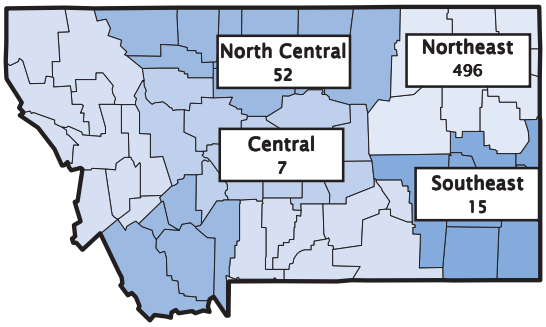
AC AVONLEA stays at third place in Montana despite a slight dip in acreage to 5 percent. It is a high protein, good quality variety that has better straw strength than Kyle, but slightly lower yield than Mountrail and Lebsock, varieties that gained acres in 2005.

DURUM WHEAT VARIETIES PLANTED ACRES IN MONTANA

VARIETY	2004 %[1]	2005 %[1]	2005 ACRES (1,000)
Mountrail	40.9	50.6	288.9
Kyle	33.9	21.3	121.3
AC Avonlea	7.5	5.4	30.8
Lebsock	2.3	5.2	29.7
Alzada	–	1.9	11.1
Monroe	1.6	1.8	10.4
Ward	2.8	1.7	9.8
Pierce	–	1.2	6.9
Ben	2.7	1.1	6.0
Other & Unknown[2]	8.3	9.8	55.1
All Varieties	100.0	100.0	570.0

1/ Percentages may not add to 100 due to rounding.
2/ Other includes other varieties not listed and unknown varieties.

MONTANA AGRICULTURAL STATISTICS DISTRICTS 2005 PLANTED AREA (1,000 ACRES)



DURUM WHEAT VARIETIES IN MONTANA SHARE OF 2005 PLANTED ACRES BY CROP DISTRICT

VARIETY	NORTH CENTRAL	NORTH EAST	CENTRAL	SOUTH EAST	TOTAL STATE
			PERCENTAGE (%)[1]		
Mountrail	0.0	57.5	0.0	24.7	50.6
Kyle	29.2	21.4	0.0	0.0	21.3
AC Avonlea	10.6	5.1	0.0	0.0	5.4
Lebsock	2.7	5.7	0.0	0.0	5.2
Alzada	21.3	0.0	0.0	0.0	1.9
Monroe	0.0	2.1	0.0	0.0	1.8
Ward	0.0	1.5	0.0	16.0	1.7
Pierce	0.0	1.4	0.0	0.0	1.2
Ben	3.1	0.2	0.0	22.7	1.1
Other[2]	33.1	5.1	100.0	36.6	9.8
			1,000 ACRES		
All Varieties	52	496	7	15	570

1/ Percentages may not add to 100 due to rounding.
2/ Other includes other varieties not listed and unknown varieties..

handling & transportation

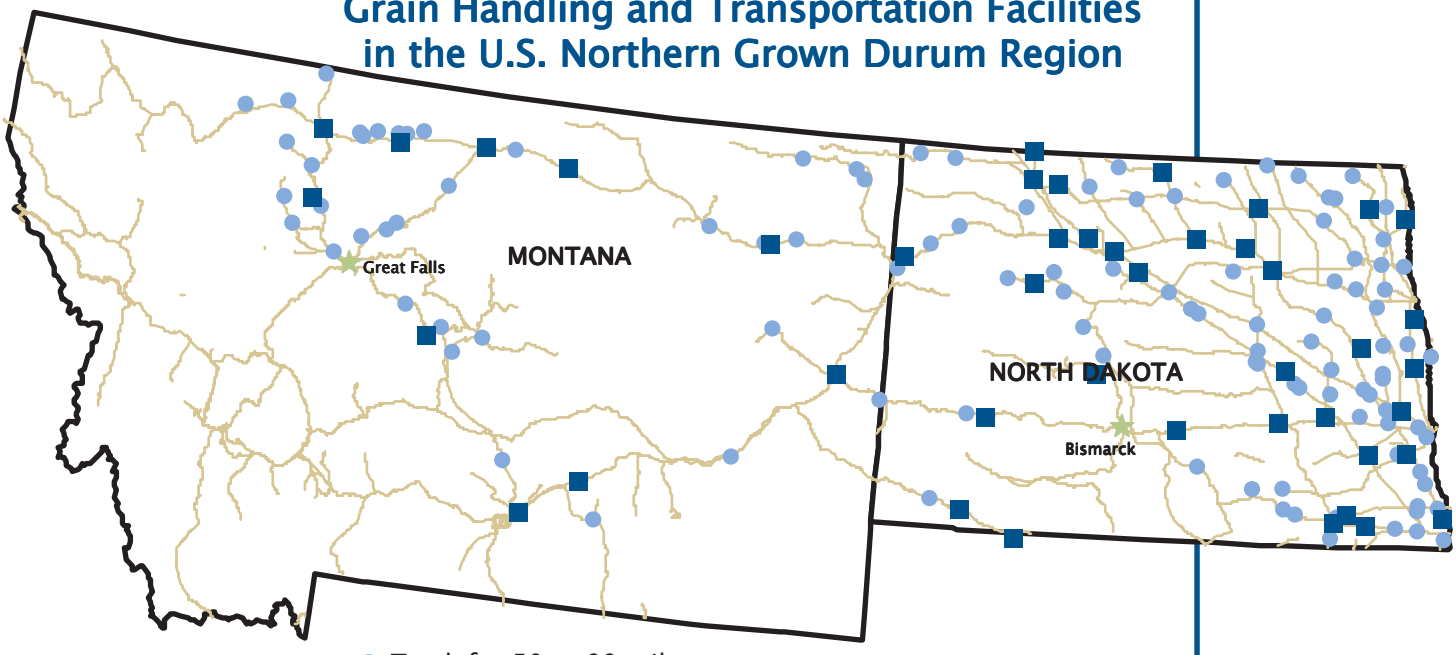
The durum wheat growing region in the Northern Plains has a vast network of country elevators to facilitate efficient and precise movement to domestic and export markets. On average, nearly 80 percent of the region's wheat moves to markets by rail. Duluth is the only export market serviced by a large share of trucks. Shipments to the Pacific Northwest and Gulf export markets are almost entirely by rail, with some barge movement to the Gulf. The dominant railroad is the Burlington Northern Santa Fe, followed by the Canadian Pacific.

A majority of the elevators in the region have the ability to ship 50 railcar units, with several equipped to ship 100 car units. Each rail car holds approximately 3,500 bushels (95 metric tons) of wheat. Some of the 100-car shippers have invested in "shuttle" capabilities. Shuttle-equipped facilities receive the lowest rates, sharing volume and transaction efficiencies with the railroad.

The diverse rail shipping capacities and widespread network of elevators are strengths buyers can capitalize on, especially as their demand heightens for more precise quality specifications and consistency between shipments. Buyers are increasingly exploring origin-specific shipments. Many international buyers now find it possible to request wheat from certain locations to optimize the quality and value of wheat they purchase.

The rail and elevator network in the U.S. northern grown durum region is well suited for meeting the increasing quality demands of both domestic and international customers.

Grain Handling and Transportation Facilities in the U.S. Northern Grown Durum Region



Source: Upper Great Plains Transportation Institute

FUNDING & SUPPORT

North Dakota Wheat Commission

Montana Wheat and Barley Committee

U.S. Wheat Associates